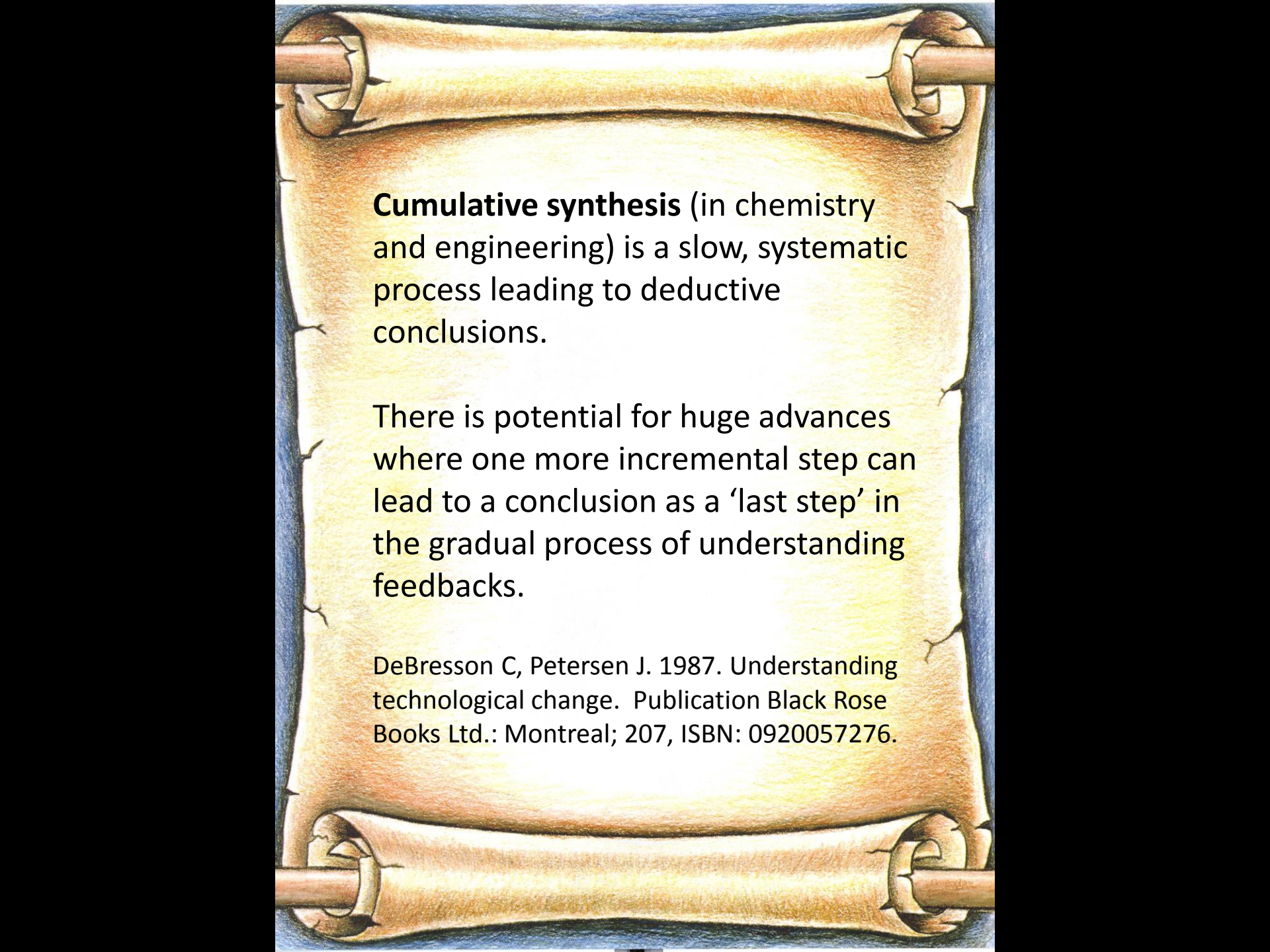
A yellow scroll with a blue border, featuring two wooden rollers at the top and bottom. The text is written in a black, calligraphic script.

*One more  
measurement doth  
a thesis make. . .*

*Opportunities at  
WGLEW*



A scroll with text on a dark background. The scroll is unrolled, showing a light-colored parchment-like surface with a dark border. The text is written in a serif font. The scroll is held by two wooden rods at the top and bottom, with visible binding details.

**Cumulative synthesis** (in chemistry and engineering) is a slow, systematic process leading to deductive conclusions.

There is potential for huge advances where one more incremental step can lead to a conclusion as a 'last step' in the gradual process of understanding feedbacks.

DeBresson C, Petersen J. 1987. Understanding technological change. Publication Black Rose Books Ltd.: Montreal; 207, ISBN: 0920057276.





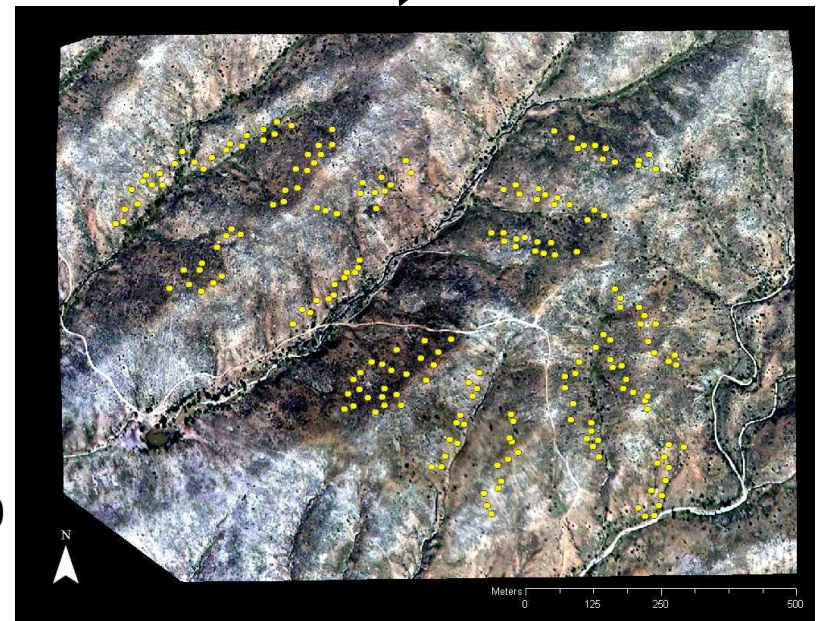
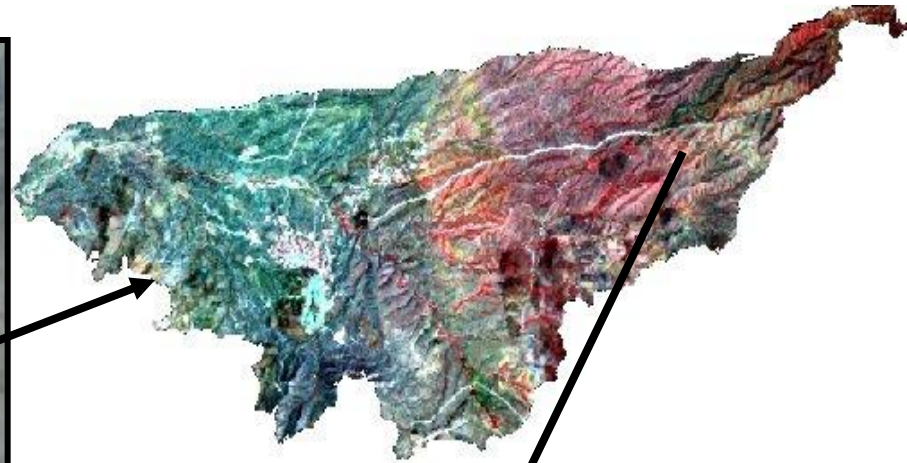
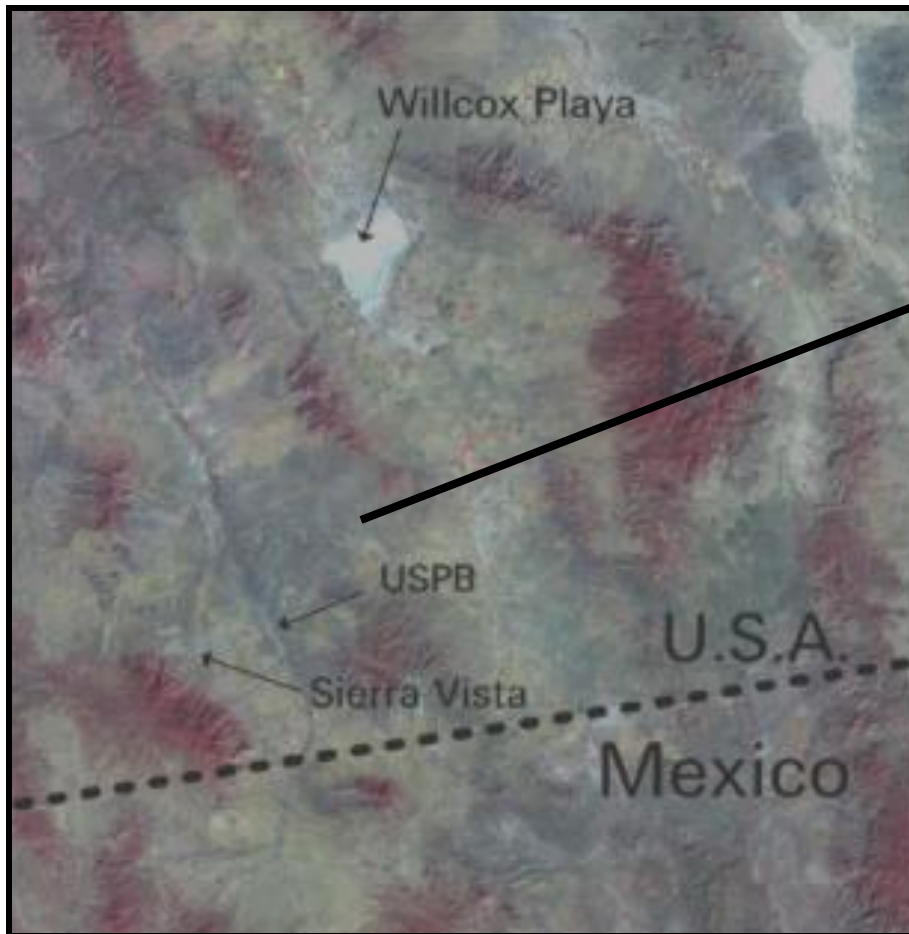
# *Walnut Gulch Experimental Watershed: The Land of Opportunities*



**Regular & Automated Measurements:**  
Rainfall, Runoff, Sediment, Met. data,  
Soil moisture & temperature, Veg. data,  
CO<sub>2</sub> & Water Flux, Soil respiration, ...



## Landsat TM Color Composite of WGEW

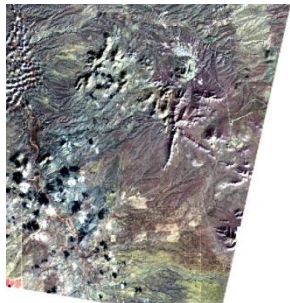


**Aerial Photo – Charles Curtis UA**

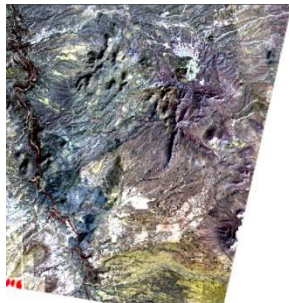
### *Opportunities:*

- Over 100 TM images available from 1990+
- 1-m aerial photos taken 2008, 2009 & planned 2010
- Quickbird 2.4-m images in 2006 & 2010
- NASA Master overflight planned for October 2010

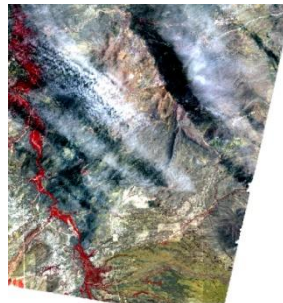




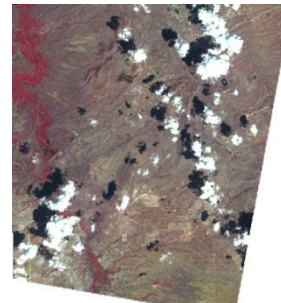
DOY015



DOY079



DOY191

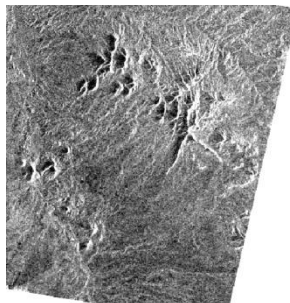


DOY255

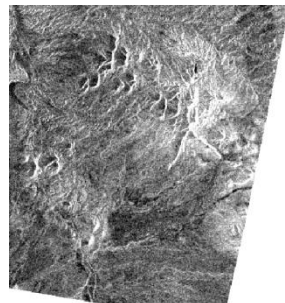
**Landsat TM  
Color Composite**



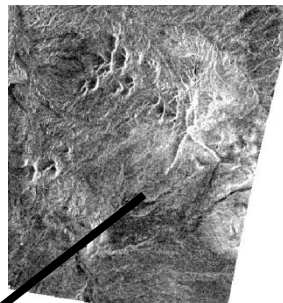
**ERS C-band  
Radar**



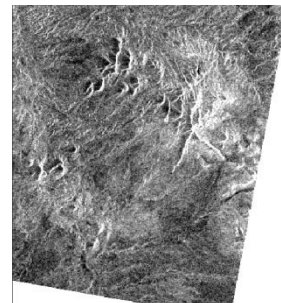
DOY012



DOY082



DOY187

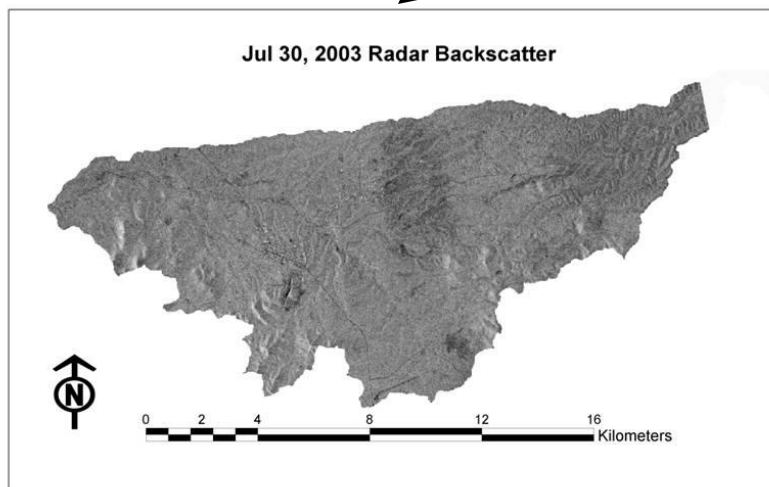


DOY257

***Opportunities:***

- 22 ERS SAR images
- 14 Envisat SAR images
- 12 Radarsat SAR images
- WGEW Soil Moisture & Roughness Maps

**WGEW Surface Soil Moisture**



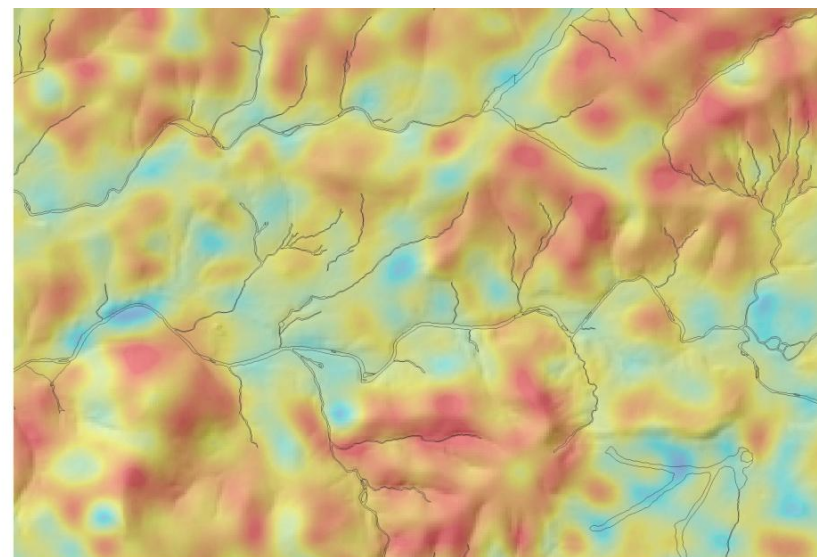
**Soil Moisture**

7/29/03



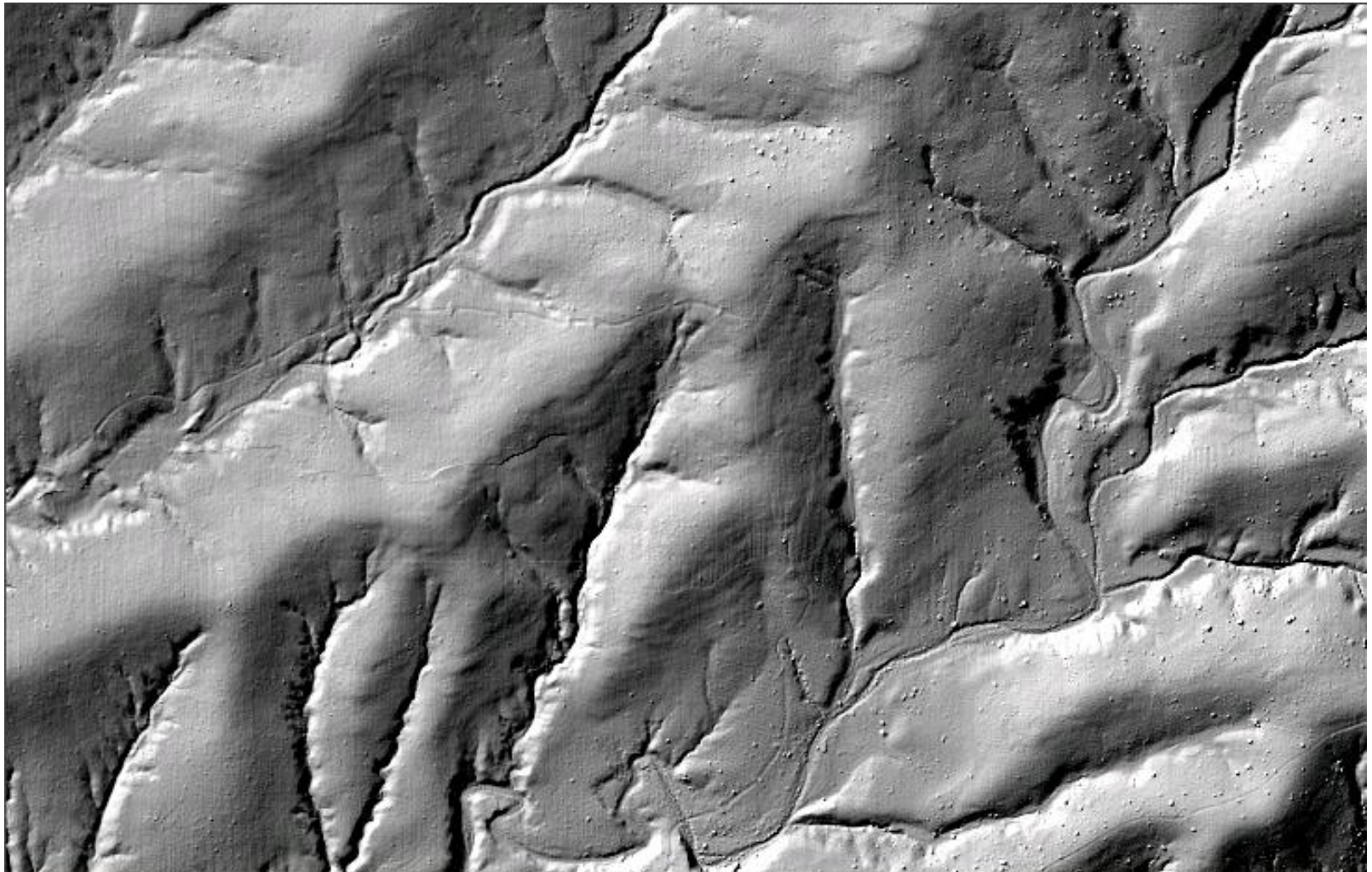
High (0.1)

Low (0.0)



0 0.25 0.5 1 1.5 2 Kilometers

*Such stuff as dreams are made of:  
WGEW Lidar 2004*





# *Vegetation Measurements:*

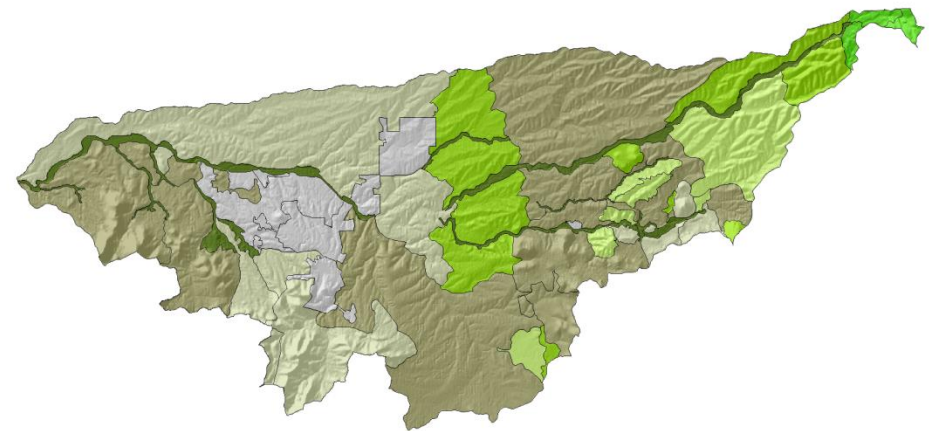
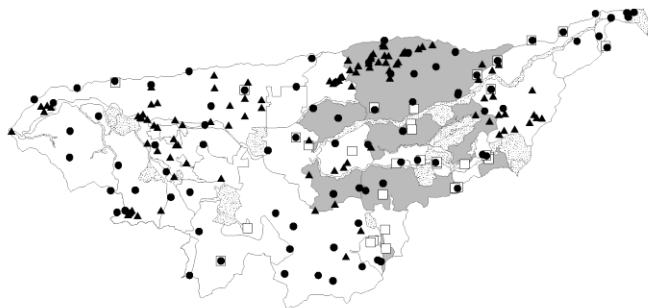
1967

1994

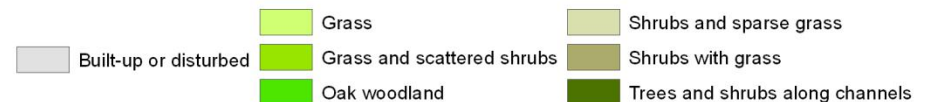
2005

*How poor are they  
that have not patience*

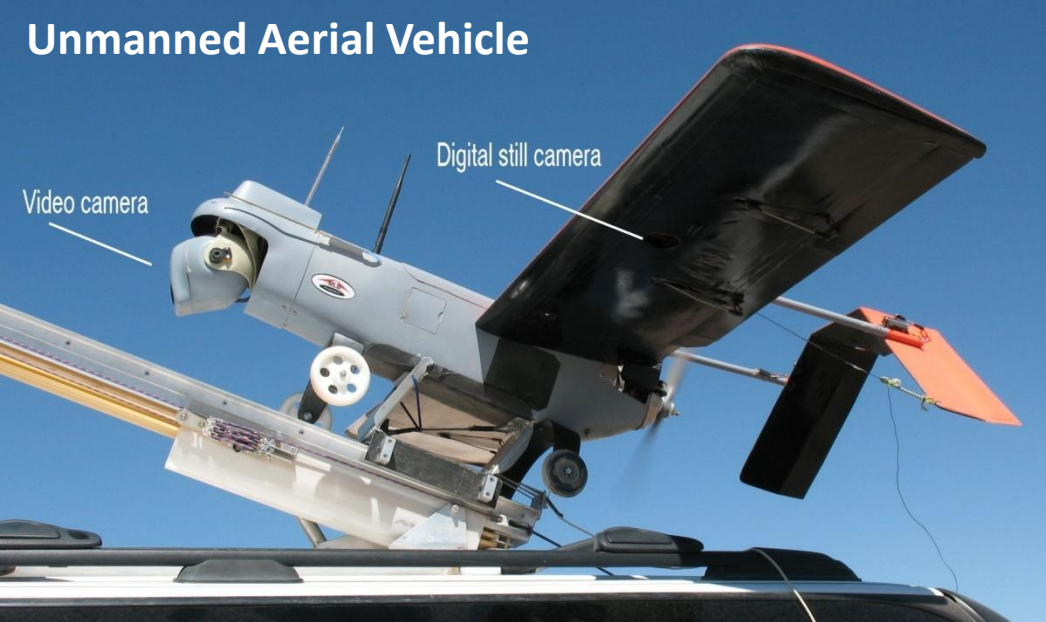
Location of vegetation transects at WGEW



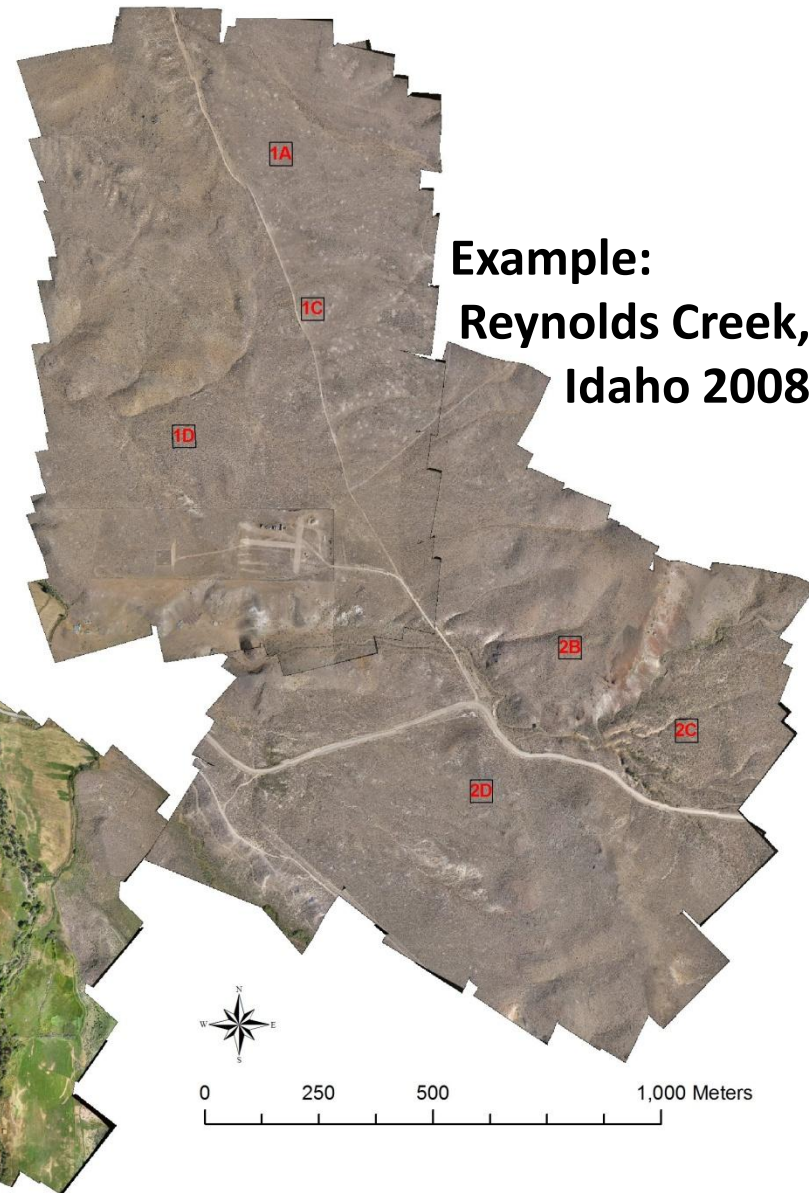
Vegetation Map Classes



# Unmanned Aerial Vehicle



**Example:  
Reynolds Creek,  
Idaho 2008**



*There is a method in the madness*

## *Opportunity:*

- UAV overflight at Kendall
- Images with 0.3-m resolution
- Planned for Spring/Summer 2011

*Images: Courtesy of Andrea Laliberti, ARS, NM  
Laliberte et al., PERS 2010*



# Data Availability: <http://www.tucson.ars.ag.gov/dap>

**Image Data**

Key Number	147	Has Alt Data?	<input checked="" type="checkbox"/>
File Name	mtah173	Has Aircraft Data?	<input type="checkbox"/>
Platform Type	Landsat 5	Has Yoke Data?	<input checked="" type="checkbox"/>
Sensor Type	TM	Has RadioSonde?	<input type="checkbox"/>
Date Acquired	6/22/97	Has SubScene?	<input checked="" type="checkbox"/>
Overpass Time	10:34:00 AM	Can Share?	<input type="checkbox"/>
Project Name	MAC LST	Release follow	<input type="checkbox"/>
View Angle		Media Original	8mm
Bands Used	1,2,3,4,5,6,7	Media SetNum	50
Resolution	28.5 m	Media Location	CD #
Processing Status	s - DN (no Alt. or geo.)	Loaned To	
Image Quality		Archived on CD?	<input checked="" type="checkbox"/>
Cloud Cover		Has Duplicate1?	<input checked="" type="checkbox"/>
Weather	clear	File Size	317 M
Latitude	33:09:50N	Related Files	
Longitude	112:27:41W	Read Me File	readm
Vendor Frame	37,37	Remarks	subsc
File Extension	img		

WIGDA

**Ground Data**

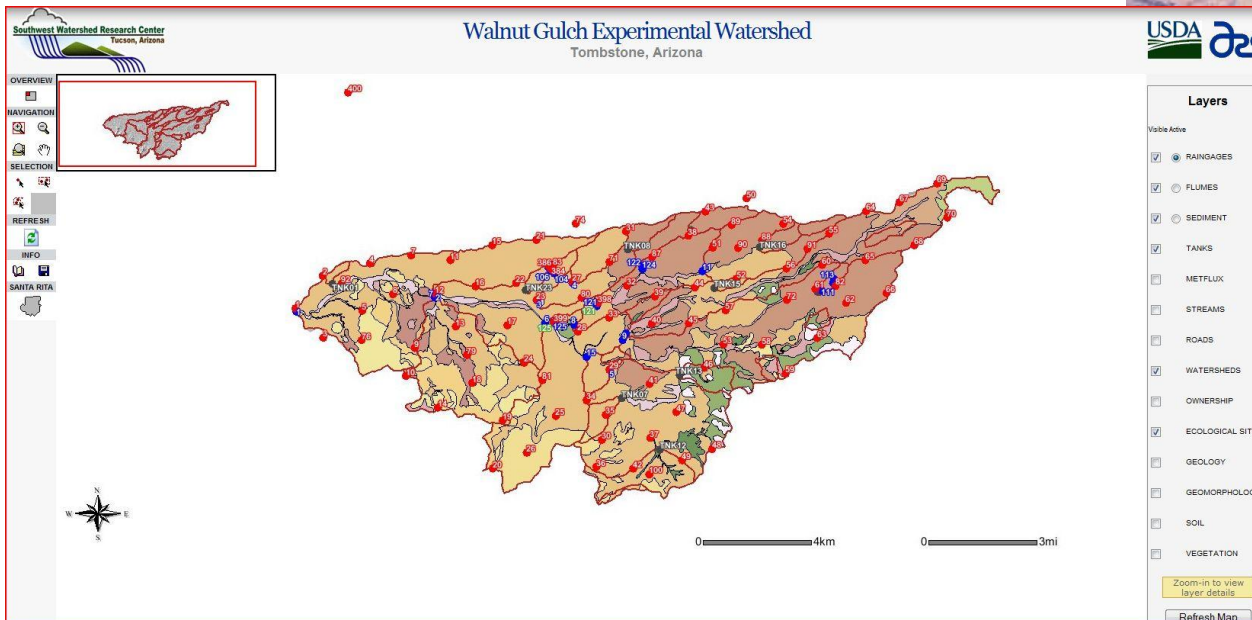
Key Number	648	Split File Name over Code Fields	<input type="checkbox"/>
File Name	mbbh173_97v	Gather Code Fields into File Name	<input type="checkbox"/>
Experiment Code	m - Maricopa Farm		
Exp Code Suffix	b - Bare Soil (MAC)		
Measurement Type	b - Exotech - yoke-based		
Year Code	h - 1997		
Day of Year	173	Day of Year = 6/22/97	
Multiple Data Sets		Multiple Data Set Sequence Letter (a,b,c,etc.)	
File Extension	97v	File Extension (may include year)	
Measurement Notes		Has Alt Corr Notes?	<input type="checkbox"/>
File Location	Mac97	Has Field Notes?	<input type="checkbox"/>
Related Image Files	mtah173	Has Air Flight Log?	<input type="checkbox"/>
Location Notes	field 13 in bare soil		

Records: 14 | 62 | 728

ARIA



DAP



Precipitation  
Runoff  
Sediment  
Meteorological data  
Soil moisture  
Soil erodability  
Vegetation measurements  
CO<sub>2</sub> & Water Flux  
GIS layers  
WIGDA